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Motivation and Achievement in Tennis

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MOTIVATION AND ACHEIEVEMENT IN TENNIS

by

Scott Bentley

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Abstract

Each person is motivated by different things and in different ways. Athletes specifically use how they are motivated to achieve goals, improve in practice, and overcome difficult tasks and opponents. Coaches can play a crucial role in helping their athletes recognize their motivational style (extrinsic or intrinsic) and learn how to best motivate themselves. My goal in this study was to work with 13-18 year old tennis players in Cache Valley and see if the participants improved more with coaching tailored to their motivational style than with general, non-specific coaching. Each participant was given the same motivational survey, the same warm-up, ran through a warm-up of each groundstroke (6), and the total number of 10 made shots was recorded for each stroke after the warm-up and coaching phase. The participants worked with me for 20-30 minutes and did a cool-down stretch afterwards. Each participant worked with me on two occasions to show improvement between the two sessions. The results of this study show that the participants not only improved more between the two sessions when they were coached according to how they are motivated, but also performed better during the first lesson than did those who were coached with general, non-specific coaching. This leads me to suggest that coaches should, if they want to maximize a players' progress, coach each player according to how that player is motivated.

Acknowledgments

First and foremost I need to thank Dr. Richard Gordin. He has been a great teacher, mentor, and friend to me throughout the years that I have known and worked with him. The inspiration for this project began in his Sports Psychology class. It was from him that I began to be interested in the mental aspects of sport performance. Dr. Gordin has helped me with three honors contracts as well as this thesis, so I am indebted to him and very thankful for all of the time he has spent with me. He has motivated me to achieve my potential and will be someone I remember and hold in high esteem throughout my life.

I'd also like to thank Dr. Eadric Bressel for the role he has played as my honors advisor and for being a committee member for my thesis project. He has been great to work with and has always been helpful and encouraging.

In relation to this project, I'd like to thank the Superintendents of both the Logan and Cache County School Districts for approving this project. Principal Shane Ogden of Logan High School has been a great help in getting this project going as have Dave Reynolds and Missy Stuart, the tennis coaches from Logan High School and Sky View High School respectively. I am especially grateful to those at Logan High that allowed me to use their indoor facilities at the Logan Recreation Center. Without the help of all these people, this project wouldn't have been a success.

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Introduction

Each person is motivated by different things and in different ways. Athletes specifically use how they are motivated to achieve goals, improve in practice, and overcome difficult tasks and opponents. Coaches can play a crucial role in helping their athletes recognize their motivational style (extrinsic or intrinsic) and learn how to best motivate themselves. My goal in this study was to work with 13-18 year old tennis players in Cache Valley and see if the participants improved more with coaching tailored to their motivational style than with general, non-specific coaching. Each participant was given the same motivational survey, the same warm-up, ran through a warm-up of each groundstroke (6), and the total number of 10 made shots was recorded for each stroke after the warm-up and coaching phase. The participants worked with me for 20-30 minutes and did a cool-down stretch afterwards. Each participant worked with me on two occasions to show improvement between the two sessions. The results of this study show that the participants not only improved more between the two sessions when they were coached according to how they are motivated, but also performed better during the first lesson than did those who were coached with general, non-specific coaching. This leads me to suggest that coaches should, if they want to maximize a players' progress, coach each player according to how that player is motivated.

Methods

Fielding Participants

This study was conducted with 13-18 year old students from the surrounding schools in Cache Valley, principally Logan and Sky View High Schools. Before contacting each student, I obtained approval from the Superintendents of each school district and the Principals of the schools in that order. After having talked with each of them via email (and with Principal Shane Ogden of Logan High in person), I talked either over the phone, by email, or in person with the coaches of each school. The main coaches that I worked with were Missy Stuart, girls' tennis coach at Sky View High School, and Dave Reynolds, boys' tennis coach at Logan High School. In Sky View's case, I met with the students from the boys and girls teams in Coach Stuart's classroom. I talked with them about the parameters of the project and asked them to leave their names and phone numbers if they had interested in participating. Each student was given a

permission form that both they and their parents needed to review and sign prior to beginning the study. For Logan High School, I was sent a copy of the tennis ladder (a list ranking players from best to worst) for the boys team for the previous year. Although I talked to the girls coach from Logan about the project, I was unable to get the information about any of the girl players. I called various boys that I determined were of intermediate skill and explained the project to them. I set up a half hour time slot with each player if they wanted to be part of the study. At the end of the study, I worked with 12 participants (n=12).

Motivation Questionnaire

After giving me their signed consent form, I asked each participant to answer a questionnaire that I adapted to tennis from a questionnaire on intrinsic and extrinsic motivation (Shia, 1986). The questionnaire had 16 statements with an equal number of intrinsic and extrinsic oriented statements. Each question was scored on a scale from 1-7 with 1 meaning "the sentence does not describe [the player] at all" and 7 meaning "the sentence strongly describes [the player]" (Shia, 1986). A score of 4 on the scale meant that the participant did not strongly associate in either direction with the statement. As far as how I scored the questionnaire, a score of four (4) on any question, whether it was intrinsic or extrinsic, corresponded to a score of zero (0). For an intrinsically directed statement, a score of five, six, or seven (5, 6, 7) was given a score of one, two, or three (1, 2, 3) respectively. If the client circled a three, two, or one (3, 2, 1), however, a score of negative one, two, or three (-1,-2,-3) was given. The reasoning behind the negative scores is that by dissociating with an intrinsically directed statement means that the participant is more extrinsically motivated for that specific question. Also, a negative score doesn't mean that extrinsic motivation and extrinsically motivated individuals are at a disadvantage. It was just a scoring system that I came up with that worked for me. Extrinsic motivation is a necessary part (as is intrinsic motivation) of sport for both athletes and coaches. Both extrinsically and intrinsically motivated coaches and athletes can be successful. For an extrinsically directed statement, a score of five, six, or seven (5, 6, 7) was given a score of negative one, two, or three (-1,-2,-3) and a score of three, two, or one (3, 2, 1) corresponded to a score of one, two or three (1, 2, 3) respectively. The same reasoning behind the scoring for extrinsically directed statements that I used for the intrinsic questions applies here. A positive one, two, or three (1, 2, 3) are given for reported scores of three, two, and one (3, 2, 1)

respectively because they show that the participant is more intrinsically motivated for that specific question. After the entire survey had been filled out, I calculated the total score based on the scoring system previously mentioned. The cut off score that determined if a participant was more like one motivational style than another was 5. A score greater than or equal to 5 was designated as "intrinsically motivated" and any score less than 5 was deemed "extrinsically motivated". This value isn't something used by Shia, but is something that I as the tester, upon a subjective analysis of the test and the players' personalities in regards to sport, determined. A statistical analysis done after the administration of all the questionnaires (n=12) was done and shown to be statistically significant. These results will be discussed later on.

Although extrinsic and intrinsic motivation are not the only types of motivation, and there are various classifications within both of these types of motivation (Pelleier, Fortier, Vallerand, Tuson, Briere, & Blaise, 1995), I focused this questionnaire and my study on intrinsic and extrinsic motivation in general. Intrinsically motivated individuals "strive inwardly to be competent and self-determining… [t]hey enjoy competition… [but] focus on having fun, and want to learn skill to the best of their ability. [They] participate for the love of sport… [and] play for pride" (Weinberg & Gould, 2007). Professional golfer Tiger Woods made the intrinsically oriented comment specific to specific golfers that accomplished golfers "enjoy the serenity and the challenge of trying to beat their own personal records" (Scott, 1999). On the other hand, extrinsically motivated athletes are motivated by awards, trophies, scholarships, prize money, outcomes, championships, and recognition. In other words, "it involves participation in sport for some kind of reward that is external to the process of participation" (Karageorghis & Terry). Although he was definitely very intrinsically motivated as well, Michael Jordan once said, "I've missed more than 9,000 shots in my career. I've lost almost 300 games. 26 times, I've been trusted to take the game winning shot and missed. I've failed over and over and over again in my life. And that is why I succeed" (Jordan, 1998). He used these losses and the desire to not lose again as the fuel for the fire that drove him to win six NBA championships and many other accolades.

Warm-Up

Although most professionals in the Exercise Science field agree that a static warm-up is actually harmful to sport performance (except for in the case of sports that require flexibility i.e. dancing, gymnastics), there is evidence supporting improved performance with a dynamic warm-up that is sport specific. According to a recent study in which 43 different studies were reviewed, "half of the studies assessing the acute effect of static stretching reported a detrimental effect on performance… [whereas] dynamic stretching showed no negative effects and improved performance in half of the trials". Another finding was that "[a]cute **dynamic stretching** may also be effective in inducing smaller gains in ROM prior to **performance** without any negative effects being observed". In support of what I mentioned earlier that stretching may be beneficial in sports such as gymnastics and dance, the study found that "athletes that require great range of motion (ROM) and speed in their sport, long-term stretching successfully enhances flexibility without negatively affecting performance" (Kallerud & Gleeson, 2013).

Based on this evidence, I thought it prudent to have each participant go through the same dynamic stretching warm-up for both sessions prior to any tennis. Each participant did carioca, alternating arm-swing cross-overs, a sprint followed by backpedalling, and serve motion swings.

For carioca, each participant faced the wall and, starting at the net, jogged at medium pace sideways while crossing their legs back and forth alternating which leg went in front and behind. Once they reached the baseline, they repeated the same exercise facing the same direction. Having them repeat the same exercise facing the opposite direction uses the same muscles used during the first half of the exercise, but on the opposite leg. I chose this exercise because a lot of the movements in tennis are side-to-side. These motions are especially present at the baseline during groundstrokes and are also seen somewhat at the net during volleys (forehand and backhand) and overheads.

The alternating arm-swing cross-overs are done by horizontally abducting/adducting the arms from hyperextension to full flexion while alternating which arm goes over the top of the other with each repetition. This exercise was done while standing in place. This motion is especially important in the swing phases that the arm goes through at the shoulder during

groundstrokes (forehand, backhand, and slice) as well as during volleys (forehand and backhand).

The sprint followed by backpedalling was done over the same distance as the carioca. Each participant sprinted from the net to the baseline and then backpedalled to the net. There are three main parts to this exercise that I find important to tennis. The sprint is a quick reaction going from a relatively stationary state to all out as quickly as possible. These quick bursts of speed are necessary in instances such as drop shots (also known as slices), short ball approaches, and shots that clip the top of the net. The next important phase is the quick slowing of the sprint and the transition into a backpedal. This phase is needed when an approach shot goes bad or when an opponent successfully lobs the ball over your head. A player won't necessarily backpedal during these shots, but it's the quick transition that's important.

The final exercise is the most crucial, I believe, because it's the most overlooked movement. In all of the lessons and tennis practices I've been a part of, no coach has ever had the players perform a dynamic stretch for their shoulders through the serve motion. I've seen so many players injure their shoulders during serves or overheads. That is why I included the serve motion swing. For this exercise, the participant moved their arm while holding their racket through their serve motion in a continuous, fluid arc. This helps the shoulder muscles (especially the musculotendinous cuff muscles) be prepared for the large amounts of force produced during a serve and an overhead.

Groundstrokes

Each participant was given an undetermined number of practice groundstrokes for each of six (6) strokes during both sessions. These six strokes were the forehand, backhand, forehand volley, backhand volley, overhead, and serve. I say that there were an undetermined number of practice groundstrokes because each player needed different amounts of time spent coaching different strokes. When a players' form looked good on a certain stroke, little coaching was required in comparison to a stroke where their form wasn't so polished. After I determined that the player had hit enough shots of a particular stroke for warm-up, I began recording the number of shots hit within the court out of ten. In the majority of the cases, I didn't let the player know when I started counting the strokes. The only exception was for those participants in the

experimental group who were extrinsically motivated. At times I would let these particular participants know that I wanted them to focus on hitting the next 10 shots in play. This was a way to motivate them extrinsically to achieve a goal that I as a coaching figure had set for them. Most of the time, with extrinsic participants, I would start counting and then set a goal for them to hit in the next four or five. Another way that I motivated extrinsic, experimental group participants was by telling them, during their second visit, that I wanted them to beat the total number of shots they made on their first visit. For example, if a participant had correctly hit five strokes during their first session on their forehand volley, I would challenge them to get six or seven.

For intrinsically motivated participants, I used visualization techniques or made mini-games out of the groundstroke drills that we did. I asked some of the participants, while they were on the court and at home, to visualize before hitting a shot where they wanted it to go. This technique was used especially during serving (for most intrinsic participants) but also for beginning players through all shots. An example of a mini-game that I used was in serving. I had a pyramid of stacked tennis balls set up within the service box and asked the participant to aim for and try to knock down the stack of balls. This was one way of getting them to have more fun and relax while serving. I even participated in this serving activity with them, making a game out of who could knock the stack down first.

Cool-Down

I had each participant run through a brief cool-down to help return their heart rate to baseline safely and ensure proper venous return without causing syncopal reactions. This consisted of picking up the tennis balls that we'd used, and running through some of the warm-up exercises such as carioca and arm-swings but at a slower, more controlled pace. The reasons I have given for cooling down after exercise are also given in a study I read that states "[c]ooling down after exercise means decreasing the body temperature, decreasing heart rate and stretching the muscles and tendons. A cool down can reduce the chance of dizziness or fainting caused by the pooling of venous blood in the extremities and reduce the level of adrenaline in the blood. Static stretching helps cool and relax the muscles and facilitate an improvement in maximum range of motion" (Schnitzer & Trela, 2012).

Results

There were eight (8) participants who were classified as "intrinsically motivated" individuals with a mean questionnaire score of 13.5. Four (4) participants were classified as "extrinsically motivated". Their mean questionnaire score was 0.25. The statistical significance of these means through analysis of an independent sample test if equal variances are assumed is .007. If equal variances are not assumed, the significance of this t-test for equality of means is .003.

Group Statistics (Table 1)

	IntrinsicExtrinsic	N	Mean	Std. Deviation	Std. Error Mean
SurveyScore	1.00	8	13.5000	7.09124	2.50713
	2.00	4	.2500	4.50000	2.25000

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
SurveyScore	Equal variances assumed	.007	13.25000	3.93422
	Equal variances not assumed	.003	13.25000	3.36871

The mean questionnaire score for the participants in the control group (n=6) was 7.83. The mean questionnaire score for participants in the experimental group (n=6) was 10.33. The significance of these means when analyzed with an independent samples test looking at the equality of means was 0.651 when equal variances are assumed. When equal variances are not assumed, the significance of the t-test for equality of means was 0.652.

Group Statistics (Table 2)

	Group	N	Mean	Std. Deviation	Std. Error Mean
SurveyScore	1.00	6	7.8333	7.70498	3.14554
	2.00	6	10.3333	10.63328	4.34102

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
SurveyScore	Equal variances assumed	.651	-2.50000	5.36087
	Equal variances not assumed	.652	-2.50000	5.36087

The mean number of shots hit within court boundaries (singles boundaries) during the first session with the participants in the control group (n=6) was 39.0 shots. The mean number of shots hit within the same court boundaries during the first session with the participants in the experimental group (n=6) was 34.5 shots. The statistical significance of this data when analyzed using an independent samples test for equality of means was 0.268 when equal variances are assumed and 0.269 when equal variances are not assumed.

Group Statistics (Table 3)

	Group	N	Mean	Std. Deviation	Std. Error Mean
First	1.00	6	39.0000	7.26636	2.96648
	2.00	6	34.5000	5.95819	2.43242

Independent Samples Test

	t-test for Equality of Means			
				95% Confidence Interval of the Difference
Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower

First	Equal variances assumed	.268	4.50000	3.83623	-4.04765
	Equal variances not assumed	.269	4.50000	3.83623	-4.09234

When comparing the difference between the two training sessions, the mean number of shots hit within the boundaries of the tennis court by the control group (n=6) was 0.50 shots. The same comparison was done with the experimental group (n=6) and their mean number of correct shots was 5.67 shots. When analyzed using an independent samples test for equality of means, the significance when equal variances are assumed was 0.025. When equal variances were not assumed, the significance was 0.033.

Group Statistics (Table 4)

	Group	N	Mean	Std. Deviation	Std. Error Mean
PlusMinus	1.00	6	.5000	2.07364	.84656
	2.00	6	5.6667	4.32049	1.76383

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
PlusMinus	Equal variances assumed	.025	-5.16667	1.95647	-9.52596
	Equal variances not assumed	.033	-5.16667	1.95647	-9.76863

Discussion

The first analysis run using SPSS was done to see if the method I used to assess the participants' motivational style was an accurate assessment. Group one (1) represents the intrinsically motivated subjects and group two (2) represents those who were extrinsically motivated. The mean scores for the two groups show a difference of a little over +13 with a significance level of 0.007. This result means that there is a statistically significant difference between the two groups. In essence, the questionnaire I used was an accurate measurement of the two motivational styles that I tested for. The likelihood that this was due to chance was shown to be very small according to the statistical analysis. Having this part of the research project correct was a crucial piece to my work. I needed to be able to accurately coach the participants in the experimental group according to their motivational styles in order to answer the research question I began with. That question was whether or not players would improve more between two sessions when receiving coaching tailored to their motivational style than when coached with non-specific coaching cues. This analysis shows that I correctly assessed these players' styles and was able to coach them according to the motivational style that best fit their personality.

The second analysis was done to make sure that there was an even, un-biased distribution of intrinsically and extrinsically motivated players in both the control and experimental groups. This analysis was necessary to eliminate any chance that improvement between the two sessions was to some other factor other than the specific coaching the experimental group received. The level of significance associated with this test was 0.651. This was a good result because it shows that there is no statistically significant difference between the control and experimental groups. The two groups were evenly distributed and not one motivational style outweighed the other. As I mentioned previously, this is something that I wanted to find true so as to eliminate any other possibilities for why there could be an improvement between the two sessions besides the coaching I gave them.

My third analysis looked at the differences between the two groups during their first session. This made sure that neither group was statistically better than the other at the beginning. Even though the control group had a mean score 4.5 shots higher than the experimental group, the level of significance was 0.268. This means that there wasn't a statistically significant

difference between the experimental and control groups after the first session. Both groups came in to the study with similar skill levels. This analysis eliminates the possibility that either the control or experimental group was statistically better than the other.

Finally, the fourth analysis looked at the difference in the improvement between the two sessions. Each second session score was subtracted from the first session score. The resultant score (called the PlusMinus score) shows the improvement between the two tennis sessions. So, having shown that the improvement between the two sessions could not be due to unequal distribution of the motivational types in the two groups, that the difference isn't due to skill differences at the start of the study, and that the participants were correctly assessed and coached according to their motivational style, any statistically significant difference between the two groups and their PlusMinus score would show that specifically tailored coaching does improve performance more than non-specific coaching. By looking at the level of significance from the last analysis (0.025), we see that coaching tailored to individual players does help players improve with more efficiency. By looking at the means of both groups, we see that the control group only improved by 0.500 shots. The mean score for the experimental group was 5.67 shots.

In retrospect, there are a few things that I may adapt if I were to repeat this project. First, not every participant had the same amount of time between sessions. This was mainly due to the fact that the participants had schedules that varied from week to week. I think that the results of this study would be even more convincing by having the same amount of time between sessions for each participant.

Secondly, I would have liked to have had a larger sample size participate in the project. The small sample size in this project was due to a couple of reasons. It took me longer than expected to get approval for this project from IRB (mainly because I had to resubmit the application with additional information two or three times). It also took longer than expected to get into contact with and receive approval from the various school districts. After receiving approval from the school superintendents, I had to talk to the principals and coaches of each school. Another time consuming factor was finding an indoor tennis court available during the times that I didn't have work. Also, some locations couldn't give me permission to do the project without infringing upon the company policies that don't allow people who aren't employees to use the courts to coach. Since I collected data during the winter, outdoor courts

weren't available. This did play to my advantage in the end, however, since each player had to use the same court at the same location. Although all courts are the same size, outdoor and indoor courts are very different to play in and different factors (such as environment, climate, depth perception, and ceiling height) affect each venue.

The final thing that I would do differently has to do with the number of balls that each player hit. Some players had never played before, so I had to teach them how to play and hit each shot. This required more time and, consequently, more tennis balls were hit. Also, since I tweaked each players' stroke when I noticed that something needed to change, some players were given the opportunity to hit more balls for that particular stroke in order to make the change permanent. In order to put each participant on the same playing field, I would give each player the same amount of warm-up strokes so that the difference in the PlusMinus score couldn't be due to more practice time with a groundstroke.

In conclusion, I believe that this study gives convincing evidence that coaches who want to see the most improvement out of their players should coach them according to how that player is motivated. According to the results of this study, coaches would see a statistically significant difference in their players' achievement by applying this principle. This has been very informative for me since I one day hope to coach sports teams. Not only is this information beneficial to coaches, but to the players as well. When a player can better understand the kind of player he or she is mentally as well as physically, they can improve their performance. They can recognize their own patterns of behavior and know how to adjust their training or performance during a match to optimize the outcome of the event. A quote I recently came across says, "You must understand the whole of life, not just one little part of it" (Krishnamurti). When a player understands the mental aspect of sport performance, as well as the physical, the emotional, and all other factors that affect them, they can become the best player possible. The only limiting factor in achieving your potential is you. Coaches who want to achieve their potential, and who want their athletes to achieve their potentials, should find out how their players are motivated and coach them with specific motivational adaptations made to elicit improved performance.

Author's Biography

Scott Bentley, born in Provo, Utah on December 21st, 1989, graduated from North Sanpete High School in 2008 as Valedictorian of 148 students. During his time in high school, he served as the Sophomore Class President, a member of the National Society of High School Scholars, and National Honor Society President. He was also the team captain for both the Varsity boys' tennis and cross-country teams for two years. Because of his G.P.A., Scott was recognized as an Academic All-State recipient for both cross-country and tennis. The average G.P.A.'s for these two sports were 4.0 and 3.993 respectively. As well as being his school's representative for Sterling Scholar in Science, Scott was the Central Utah Regional winner in that category. With these experiences under his belt, he came to Utah State University. His intention was to become a Pediatrician, but, after a two-year LDS Spanish-speaking mission in Houston, Texas, he felt like he needed to take a different path. After switching his major from Biology to Human Movement Science with an emphasis in Exercise Science and a minor in Spanish, and after considering Athletic Training, Strength and Conditioning, or becoming a Physician Assistant, he decided to further pursue his love of anatomy, physiology, exercise, and athletics with his ultimate decision being to enter the field of Physical Therapy. During his time at Utah State, he joined the National Society of Collegiate Scholars and served in its' presidency for a year. After graduating from Utah State in the spring of 2014, Scott plans to move with his wife, Amanda, and daughter, Sophia, to Denver, Colorado to attend the UC-Denver DPT program. He will study there for two and a half years after which he and his wife will decide where to settle down and begin a Physical Therapy practice.

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